NOTICE OF PUBLIC COMMENT PERIOD

DRAFT INTERIM REMEDIAL ACTION PLAN
MITIGATION OF PERCHLORATE AND VOC IMPACTS TO GROUNDWATER
RIALTO, CALIFORNIA

The RWQCB is the lead agency responsible for accepting public comment and approving the Draft Interim Remedial Information/Feasibility Study and Draft Interim Remedial Action Plan.

The RWQCB will officially begin to accept public comments on these documents from September 17, 2004 through **October 18, 2004**.

Comments should be submitted in writing to the:
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DRAFT INTERIM REMEDIAL ACTION PLAN
MITIGATION OF PERCHLORATE AND VOC IMPACTS TO GROUNDWATER
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Background

This Draft Interim Remedial Action Plan (DIRAP) was prepared to support mitigation of perchlorate and volatile organic compound (VOC) impacts to groundwater which currently threaten regional groundwater resources upgradient of the City of Rialto's water supply Well No. 3 (CR-3). Well CR-3 provides a significant portion of the City of Rialto's municipal supply needs (reportedly up to 1850 gallons per minute [gpm]). This DIRAP is intended to inform and invite the public to participate in selection of the remedial response to impacted groundwater conditions near CR-3.

Investigations of groundwater recently completed by the County of San Bernardino indicate that perchlorate and VOCs are migrating in groundwater toward CR-3 from areas adjacent to the County's Mid-Valley Sanitary Landfill (MVSL). At least in part, these source areas were once part of the Rialto Ammunition Back-up Storage Point (RABSP) that was used during World War II to store munitions and where subsequent commercial and industrial activities may have resulted in the release of perchlorate and VOCs to groundwater.

Remedial Investigation

Following detection of perchlorate and VOCs in samples from groundwater monitoring wells adjacent to the MVSL, the County of San Bernardino completed a three-phase investigation to evaluate the nature and extent of these groundwater impacts and to identify an appropriate remedial response to the observed conditions. The focused Draft Interim Remedial Investigation / Feasibility Study (DIRI/FS) for groundwater impacts involved installation of 18 groundwater monitoring wells downgradient of the interpreted source areas, and retention and analyses of groundwater samples from discrete groundwater zones.

The data collected for the Remedial Investigation (RI) indicate that groundwater upgradient of CR-3 has been impacted by perchlorate and a variety of VOCs, the most significant of which is trichloroethene (TCE). While perchlorate and VOCs have not been detected in samples taken directly from Well No. 3, these contaminants exceed state and federal maximum contaminant levels (MCLs) and/or action levels (ALs) in shallow water (approximately 400 to 500 feet below ground surface) in the immediate vicinity of the well. As a result, it is concluded that these impacts represent a current threat to the City of Rialto's water supply at CR-3.

Although potential source areas for perchlorate and VOC impacts were identified as part of the RI work completed for this project, neither the DIRI/FS report nor this DIRAP are intended to address contaminated soils in the interpreted source areas. Instead, a separate DIRI/FS will later be prepared to characterize soil impacts and to evaluate alternative remedial measures that might be taken to mitigate that condition. Following preparation of the DIRI/FS for soil impacts, a separate DIRAP will be prepared to document the preferred

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soil mitigation alternative and to solicit public comment and participation in selecting an appropriate remedial response to those impacts.

Summary of Risks

In 1997, California's Department of Health Services found levels of perchlorate in drinking water wells throughout the State of California. While the potential risks associated with perchlorate on humans are not fully understood, public health concerns currently focus on the potential effect of the anion on thyroid function. California has established a draft toxicity assessment that identifies an Action Level (AL) for perchlorate in drinking water of 6 micrograms per liter (μg/L). Perchlorate can interfere with the iodide uptake of the thyroid gland which can result in decreased production of thyroid hormones, which are necessary for prenatal and postnatal growth and development, as well as for normal metabolism and mental function in adults.

In addition to perchlorate, TCE has been identified in groundwater at concentrations exceeding both the USEPA and California Department of Health Services Maximum Contaminant Levels (MCLs) of 5 μg/L. TCE is a suspected human carcinogen that can affect (and damage) several body organs and systems such as the central nervous system, respiratory system, liver, kidneys, and heart, and may cause contact dermatitis of the skin.

Remedial Alternatives

Based on the results of the RI, a Feasibility Study (FS) was completed to evaluate alternatives to mitigate impacted groundwater conditions upgradient of CR-3. Impacts are generally limited to the elevated concentrations of perchlorate and VOCs in the groundwater upgradient of CR-3. As part of the FS, and to develop criteria to evaluate the alternatives, Remedial Action Objectives (RAOs) were established. The level of allowable exposure considered in definition of the RAOs is defined by either the federal or state MCLs and ALs.

The RAOs developed to address groundwater impacts near CR-3 included:

- The selected alternative should prevent direct contact or ingestion by the public of groundwater containing contaminants that exceed MCLs or ALs.
- The preferred alternative should assure that replacement water is provided to the City of Rialto if MCLs or ALs are exceeded at well CR-3.
- The potential for further degradation of the aquifer downgradient of CR-3 should be minimized.
- The selected alternative should comply with state and federally mandated Applicable Relevant or Appropriate Requirements (ARARs).

Eight potential remediation alternatives were initially considered with respect to their anticipated ability to meet the RAOs. Those that could meet the RAOs were retained for further analysis. The alternatives included:

- No Action – This alternative presumes that groundwater impacts will not exceed MCLs and ALs at CR-3 in the future and as a result, no remedial action is necessary. Given the facts that existing and potential impacts in the immediate vicinity of CR-3 already exceed ALs, this alternative was not evaluated in detail.

- Direct Treatment of the Aquifer – This alternative involves use of an in-situ (below ground) biodegradation treatment technology to remove contaminants directly from the aquifer before groundwater flows to well CR-3. This process employs a large number (e.g., 50 to 100) wells and relies on a time-released inoculant substrate to produce an oxygen-deficient (anaerobic) environment that promotes microbial degradation of contaminants. This option was retained for detailed consideration.

- Aquifer Treatment by Recirculating Wells Upgradient of CR-3 – This alternative involves use of an extraction well array to intercept the plume. Pumped water would then be "inoculated" at the ground surface and reinjected to the aquifer to promote biodegradation of contaminants. This option was also retained for detailed consideration.

- Well-Head Treatment at CR-3 – This alternative involves construction and operation of a treatment plant at CR-3 to remove contaminants pumped from the well. Since analyses completed for this project indicate that pumping exclusively from CR-3 would not effectively contain the plume and could "pull" contaminants to greater depths in the aquifer, this alternative was not evaluated in detail.

- Replace CR-3 Water with a New Well – This alternative involves drilling and construction of a new water supply well in an area of the Rialto-Colton groundwater basin that is not threatened by contamination. This alternative would not result in any containment of the existing release and so, would not satisfy the RAO of minimizing further degradation of the aquifer. In addition, this alternative presumes that a new well could be sited in an area free of potential groundwater impacts. Since the nature and extent of groundwater impacts in other areas of the Rialto-Colton basin have not yet been characterized, selection of an appropriate location for this well may not be possible at this time. As a result, this alternative was not evaluated in detail.

- Replace CR-3 Water with Another Source – This alternative would involve an agreement with another water supply entity (e.g., San Bernardino Valley Municipal Water District) to procure and deliver water to the City's municipal water supply system. Since this would not result in any containment of the existing release, it would not satisfy the RAO of minimizing further degradation of the aquifer and this alternative was not evaluated in detail.

- Groundwater Pumping, Above Ground Treatment, and Aquifer Recharge – This alternative would involve intercepting the contaminant plume with an array of groundwater extraction wells. Pumped water would be delivered to an above ground treatment plant where contaminants would be removed before treated water is pumped to an aquifer spreading basin (such as Cactus Basin) or otherwise returned to the aquifer. This option was retained for detailed evaluation.

- Groundwater Pumping, Above Ground Treatment, and Delivery of Water to Rialto's Supply System – This alternative also involves interception of the plume with an array of extraction wells and treatment of extracted groundwater with an above ground treatment plant. Rather than recharging the treated water back to the aquifer however, this alternative would deliver the treated water to the City of Rialto's municipal supply system. This alternative was retained for detailed consideration.

Since four of the above alternatives did not satisfy the plume containment RAO, they were not considered feasible and were eliminated from further analysis. For all the remedial alternatives that were analyzed, until the preferred alternative can be implemented, it was assumed that an alternate municipal source of water would be supplied, should perchlorate or VOC concentrations in water extracted form CR-3 exceed MCLs or ALs

The alternatives that were retained for further analysis included:

Alternative 1 - Direct Treatment of the Aquifer

Alternative 2 - Aquifer Treatment by Recirculating Wells Upgradient of CR-3

Alternative 3 - Groundwater Pumping, Above Ground Treatment, and Aquifer Recharge

Alternative 4 - Groundwater Pumping, Above Ground Treatment, and Delivery of Water to Rialto's Supply System

These remaining alternatives were considered viable for the project and were evaluated in greater detail using criteria identified by the National Contingency Plan (NCP [40 CFR 300.430(e)(9)(iii)]) to address the U.S. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements and considerations, as well as technical, policy, and end-use issues. These criteria served as the basis for selecting the preferred remedial action.

In summary, the criteria used to evaluate the four alternatives were as follows:

Federal Criteria

- Overall Protection of Human Health and the Environment
- Compliance with Applicable or Relevant and Appropriate Requirements
- Long Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

California State Criteria

- Health and Safety Risks
- Beneficial Uses of Site Resources
- Effect of Remedial Action on Groundwater Resources
- Site Specific Characteristics
- Cost Effectiveness of Alternative Remedial Action Measures
- Potential Environmental Impacts of Remedial Action

The criteria are detailed in the DIRI/FS.

Based on the feasibility analyses, it is concluded that project objectives could best be met by installing a groundwater extraction well network to intercept the plume, constructing a water treatment plant to remove perchlorate and VOCs, and delivering treated water to the City of Rialto for introduction into their municipal supply system (Alternative 4).

This alternative will take several months to permit and construct. Since the RWQCB is anticipated to require that remedial action be in place by April 1, 2005, the preferred remedial response also involves the temporary purchase of replacement water for the City of Rialto should perchlorate or VOC concentrations in water extracted form CR-3 exceed MCLs or ALs.

Draft Interim Remedial Action Plan

As described above, this DIRAP proposes construction of a "pump and treat" plume containment and treatment system, delivery of treated water to the City of Rialto, and temporary procurement of an alternative source of water if MCLs or ALs for perchlorate or VOCs are exceeded at Well No. 3.

The plume interception groundwater extraction system will include 6 wells spaced approximately 400 on center across the width of the identified plume. As conceptually designed, the well array would be positioned approximately perpendicular to the plume migration path and parallel to the City's airport runaway alignment just upgradient of CR-3 (Figure 1). Extraction wells will be constructed to a depth of approximately 525 feet using 8-inch diameter stainless steel well screen in the anticipated producing zone and mild steel blank casing above the groundwater table. To induce hydraulic containment of the plume, during times of drought (such as the current condition where groundwater levels are near historical lows), each well will be pumped at approximately 175 gallons per minute (gpm), which amounts to about 1050 gpm for the total extraction system. When groundwater levels rise in the future, pumping rates will need to be increased to maintain plume containment. The maximum pumping rate anticipated for individual wells is approximately 350 gpm, for a total maximum treatment system load of about 2100 gpm. Groundwater pumping within the wells will be automated using level-actuated controllers to assure that optimal pumping rates are achieved.

After pumped water is delivered to the ground surface, water will be conveyed via a pipeline header system to a water treatment plant. The treatment plant itself will occupy a footprint of approximately 50 feet by 50 feet and will employ widely used technologies to separately remove perchlorate and VOCs.

VOCs will be treated using granular activated-carbon (GAC) as a filter media where VOCs become bound to carbon particles. Perchlorate will be treated using ion-exchange columns to "bind" perchlorate to specially formulated resins. Spent carbon and resins will be periodically removed, replaced and hauled off site for destruction at approved facilities. Spent carbon resins will be handled and transported by trained individuals and firms that are licensed for this work. The treatment plant will be operated to yield non-detectable concentrations of perchlorate and VOCs.

Once contaminants are removed, the treated water will be disinfected and readied for delivery to the City's water supply system. Routine testing will be performed to monitor contaminant removal and to verify the adequacy of treated water for distribution to the City.

Since construction of the preferred remedial alternative could be delayed by unforeseen circumstances, the County of San Bernardino will also arrange for purchase and delivery of replacement water to the City of Rialto should perchlorate and VOC MCLs or ALs be

exceeded after April 1, 2005 but before the treatment system is on-line. If needed, replacement water will be procured from other regional water purveyors who have existing pipeline connections with the City's water supply system.

STATEMENT OF REASONS TO MITIGATE GROUNDWATER IMPACTS NEAR CITY OF RIALTO WELL NO. 3 RIALTO, CALIFORNIA

In accordance with California Health and Safety Code (HSC) section 25356.1(d), the County of San Bernardino Solid Waste Management Division (SWMD) has prepared this Statement of Reasons as part of the attached Draft Interim Remedial Action Plan (DIRAP) to mitigate perchlorate and volatile organic compound (VOC) impacts to groundwater near the City of Rialto's Well No. 3 (CR-3) in Rialto, California.

The DIRAP presents a summary of the Remedial Investigation (RI) that was completed to characterize the nature and extent of groundwater impacts near CR-3, and summarizes the risks to public health and the environment associated with those impacts. The DIRAP also provides a discussion of the remedial alternatives that were evaluated in the Feasibility Study (FS) that was prepared for the project. The DIRAP recommends a remedial alternative (Alternative No. 4) that effectively satisfies the objectives of protecting public health and the environment. More specifically, the preferred alternative most cost-effectively meets the remedial objectives of minimizing the potential for further downgradient impacts to groundwater and it assures protection of the regional water supply at well CR-3. Analysis of the preferred alternative with respect to criteria established in section 25356.1(d) also indicates that this approach is favored over other alternatives.

The recommended remedial alternative involves installation of a groundwater extraction well network to intercept the contaminant plume, construction of a perchlorate and VOC treatment plant incorporating well-documented treatment technologies, disinfection of treated water by conventional chlorination methods, and by delivery of the treated water product to the City of Rialto for introduction to it's water supply system. Since installation of the preferred remedial alternative could be delayed by unforeseen conditions, the County of San Bernardino will also arrange to purchase and deliver replacement water to the City of Rialto if water samples from CR-3 exceed the maximum contaminant levels (MCLs) for VOCs or the state Action Levels (Als).

The SWMD believes that the attached DIRAP complies with the law as specified in HSC section 25356.1. Section 25356.1(e) requires that Remedial Action Plans "shall include a statement of reasons setting forth the basis for the removal and remedial actions selected." The statement of reasons "shall also include an evaluation of the consistency of the removal and remedial actions proposed by the plan with the federal regulations and factors specified in (d) . . . . " Subdivision (d) specifies six factors against which the remedial alternatives in the DIRAP must be evaluated. The proposed remedial action is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan [NCP]), and federal Superfund regulations. The statement of reasons also includes the preliminary Nonbinding Allocation of Responsibility (NBAR) as required by HSC section 25356.1 (e).

The following discussion evaluates the consistency of the removal and remedial actions proposed by the plan with the federal regulations and factors specified in HSC section 25356.1(d) including:

1. Health and Safety Risks – Section 25356.1 (d)(1)

The chemicals of concern identified for this site are perchlorate and VOCs, particularly TCE. While the potential risks associated with perchlorate on humans are not fully understood, public health concerns currently focus on the potential effect of the anion on thyroid function. California has completed a draft toxicity assessment that identifies a maximum drinking water concentration (AL) of 6 micrograms per liter (μg/L) for this constituent.

TCE is a suspected human carcinogen that can affect (and damage) several body organs and systems such as the central nervous system, respiratory system, liver, kidneys, and heart, and may cause contact dermatitis of the skin. Both the USEPA and California Department of Health Services have established primary MCLs of 5 μg/L for TCE.

The DIRAP is intended to propose a preferred alternative to reduce the concentrations of the above constituents to non-detectable levels prior to the exposure to the public. In addition, treatment plant personnel and worker health and safety is not anticipated to be problematic since the proposed treatment system will utilize proven technologies for which substantial health and safety protocols have been developed and proven.

2. Beneficial Uses of Site Resources – Section 25356.1(d)(2)

Groundwater is an important regional resource for municipal supply and commercial/industrial purposes, and the proposed alternative will allow for continued and uninterrupted use of the aquifer in the vicinity of CR-3.

3. Effect of the Remedial Actions on Groundwater Resources

The preferred alternative will minimize impacts to the regional groundwater resource by limiting the potential for additional downgradient migration. In addition, it assures that the resource providing water to City of Rialto water supply at CR-3 is protected.

4. Site-Specific Characteristics – Section 25356.1(d)(4)

The hydrochemistry of groundwater near CR-3 has been extensively characterized. While a variety of soil types have been identified in the groundwater zone beneath the site including sandy gravels, gravelly sands, silty sands, and silts, plume migration has paralleled the groundwater and stratigraphic gradients to the southeast and has developed a relatively long and narrow "cigar shape" distribution. In the absence of remedial actions, a strong potential exists for continued plume migration further downgradient within the groundwater basin. In contrast, site specific characteristics indicate that there is an opportunity to contain the release within a relatively shallow groundwater zone in the immediate vicinity of CR-3.

5. Cost-Effectiveness of Alternative Remedial Action Measures – Section 25356.1(d)(5).

Both the capital costs and operating and maintenance (O&M) costs were considered for the four viable remedial alternatives identified in the DIRAP. The preferred remedial response (Alternative No. 4) was the most cost-effective alternative to meet the Remedial Action Objectives.

6. Potential Environmental Impacts of Remedial Actions – Section 25356.1(d)(6)

Potential groundwater impacts will be mitigated under the proposed remedial action plan and the plan will not create any significant new environmental impacts. This project will comply with provisions of the California Environmental Quality Act (CEQA) prior to construction.

7. Preliminary Nonbinding Allocation of Financial Responsibility – Section 25356.1(e)

The DIRAP must include a "nonbinding preliminary allocation of responsibility (NBAR) among all identifiable potentially responsible parties at a particular site, including those parties which may have been released, or may otherwise be immune, from liability. . . " (HSC section 25356.1(e)). The current NBAR to mitigate groundwater impacts near CR-3, as issued by the SWMD, is attached.

PRELIMINARY NONBINDING ALLOCATION OF RESPONSIBILITY (NBAR) GROUNDWATER IMPACTS NEAR CITY OF RIALTO WELL NO. 3 RIALTO, CALIFORNIA

California Health and Safety Code (HSC) section 25356.1(e) requires that the County of San Bernardino Solid Waste Management Department (SWMD) prepare a preliminary nonbinding allocation of responsibility (the "NBAR") among all identifiable potentially responsible parties (PRPs). HSC section 25356.3(a) allows PRPs with an aggregate allocation in excess of 50% to convene an arbitration proceeding by submitting to binding arbitration before an arbitration panel. If PRPs with over 50% of the allocation convene arbitration, then any other PRP wishing to do so may also submit to binding arbitration.

The sole purpose of the NBAR is to establish which PRPs will have an aggregate allocation in excess of 50% and can therefore convene arbitration if they so choose. The NBAR, which is based on the evidence available to the RWQCB, is not binding on anyone, including PRPs, RWQCB, or the arbitration panel. If a panel is convened, its proceedings are de novo and do not constitute a review of the provisional allocation. The arbitration panel's allocation will be based on the panel's application of the criteria spelled out in HSC section 25356.3(c) to the evidence produced at the arbitration hearing. Once arbitration is convened, or waived, the NBAR has no further effect, in arbitration, litigation or any other proceeding, except that both the NBAR and the arbitration panel's allocation are admissible in a court of law, pursuant to HSC section 25356.7 for the sole purpose of showing the good faith of the parties who have discharged from the arbitration panel's decision.

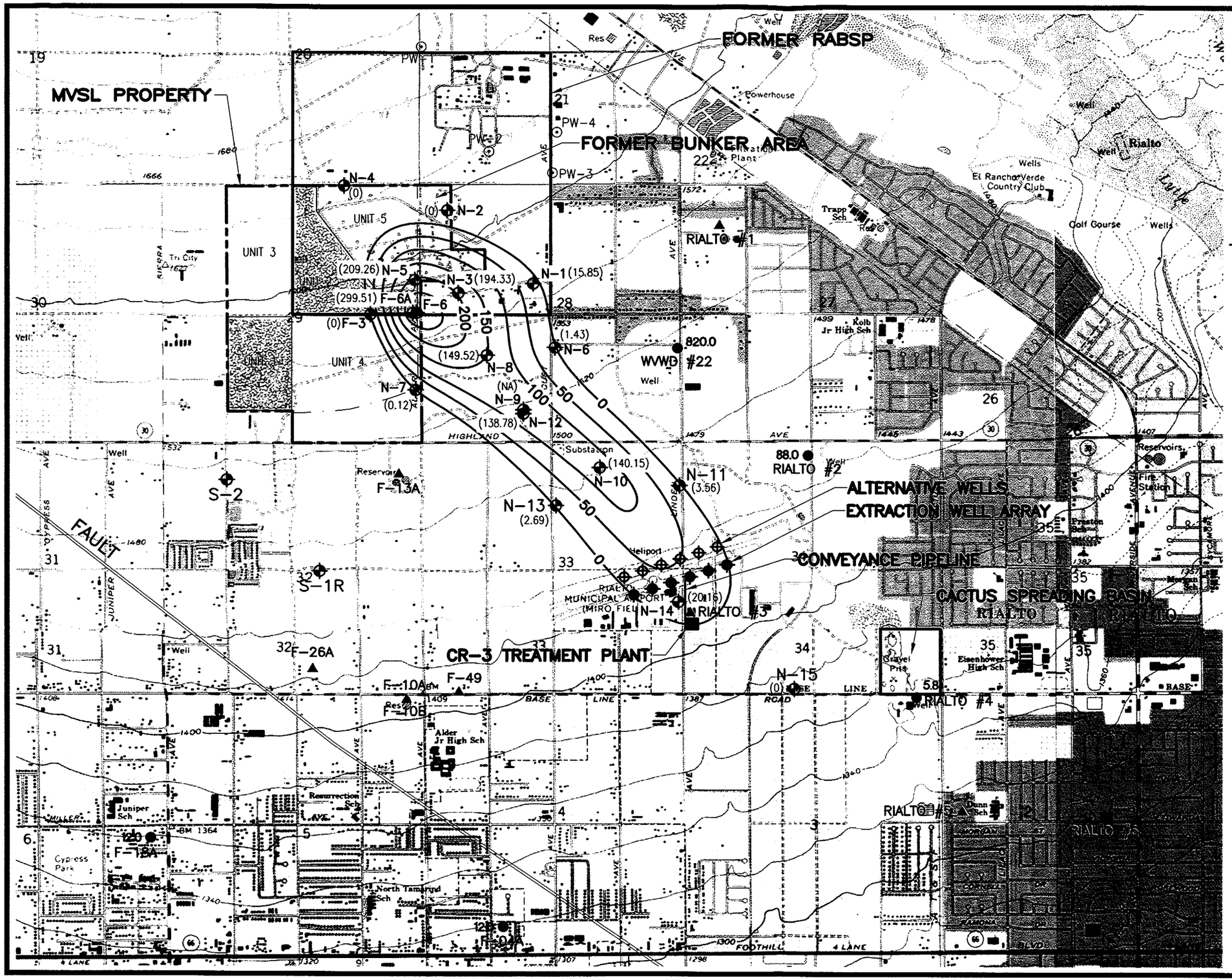
The following is a preliminary nonbinding allocation of responsibility for impacted groundwater immediately upgradient of City of Rialto Well No. 3.

The County of San Bernardino, as the owner of the Shulz Trust parcel northeast of the Mid-Valley Sanitary Landfill is a liable party based on its ownership of property that the Regional Water Quality Control Board (RWQCB) believes to be one of the sources of perchlorate. However, the County did not originally dispose of or discharge perchlorate and VOCs.

Other parties are liable for the discharge of the perchlorate and VOCs that the County is responding to in this matter, but the RWQCB is investigating the nature and extent of their responsibility and the RWQCB has not yet made any determinations thereon.

Therefore, other than this preliminary determination that the County is a liable party, the RWQCB makes no determination as to the relative extent of the County's liability compared to other parties.

FIGURES



EXPLANATION:

F-26A	WELL NAME
▲	UNCONTAMINATED WELLS
●	PERCHLORATE CONTAMINATED WELLS
12.0	HISTORICAL MAXIMUM PERCHLORATE CONCENTRATION IN $\mu g/L$ (RWQCB, 2003)
———	GROUNDWATER BASIN BOUNDARY
◆	PERCHLORATE INVESTIGATION WELLS (GLA)
—100—	LINE OF EQUAL PERCHLORATE MASS PER UNIT AREA (mg/ft^2)
(149.52)	PERCHLORATE MASS PER UNIT AREA (mg/ft^2)
⊙	MONITORING WELLS BY OTHERS
◆	CONCEPTUAL EXTRACTION WELL LOCATIONS
◆	CONCEPTUAL ALTERNATIVE WELL LOCATIONS

REFERENCE

BASE MAP: USGS 7.5 MINUTE SERIES (TOPOGRAPHIC) DEVORE, FONTANA, SAN BERNARDINO NORTH AND SOUTH CALIFORNIA QUADRANGLES

WELL AND FAULT OVERLAY: RWQCB, 2002

MVSL AND RELEASE OVERLAY: GEOLOGIC ASSOCIATES, 2003

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APPROXIMATE SCALE: 1" = 2,000'

FIGURE 1

CONCEPTUAL EXTRACTION WELL/ TREATMENT PLANT LOCATIONS

DRAFT INTERIM REMEDIAL ACTION PLAN, MITIGATION OF PERCHLORATE AND VOC IMPACTS TO GW RIALTO, CA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	SEPTEMBER 2004	2004-056